



Statewide desktop mapping of naturally occurring asbestos in NSW: known and potential for occurrence

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Geological Survey of New South Wales

Outline



- *What is Asbestos?*
- *How is NOA formed?*
- *Where is NOA found in NSW?*
- *How was the mapping undertaken?*
- *Data provision*

What is Asbestos?

- “Asbestos” is a commodity not a mineral. There are a number of minerals that can have asbestiform (asbestos-like) properties.
- NOHSC — fibre size used for asbestos monitoring in Australia fibre as being less than 3 μm in width, more than 5 μm in length and with a length to width ratio of more than 3 to 1 — i.e. long and thin
- Asbestiform minerals include a range of different mineral species that have a physical properties making them relevant to this process.
 - Chrysotile (most common in NSW)
 - Anthophyllite
 - Tremolite/actinolite
 - Crocidolite (blue asbestos)



How is NOA formed?

- Naturally occurring asbestos (NOA) may form in rocks rich in iron and magnesium
- Requires heat (300 to 450°C), hot fluids & space (caused by shearing, faulting and/or cracking) >> allows for the growth of minerals in the asbestiform habit (cross-fibre and slip fibre veins)
- Rocks need to be changed (heat, fluids, faulting) to generate asbestiform minerals.

It is the distribution of those rock types and their subsequent geological history that is the basis for the NOA potential mapping

chrysotile



picrolite



How is NOA formed?

NOA minerals form in:

- Fe–Mg-rich mafic rocks (low in silica) that have been heated, sheared and altered by hot fluids (“serpentinite” belts) >>> **chrysotile**
- Metamorphosed (heat modified) dolomites/carbonates & some mafic rocks >>> **tremolite/actinolite**
- Metamorphosed (heat affected) iron-rich units (banded iron formations) >>> **crocidolite** (blue asbestos — not found in NSW)
- High grade Mg–Fe-rich metamorphic rocks >> **anthophyllite** (rare in NSW)

Note tremolite & actinolite are common rock-forming minerals but rarely develop an asbestiform habit >> requires special conditions.

A range of issues....



Woods Reef
remediation

Effect on potential resources



Uni of Newcastle

+ Ni, Pt, Cr
conmats

+ CO₂

Mg

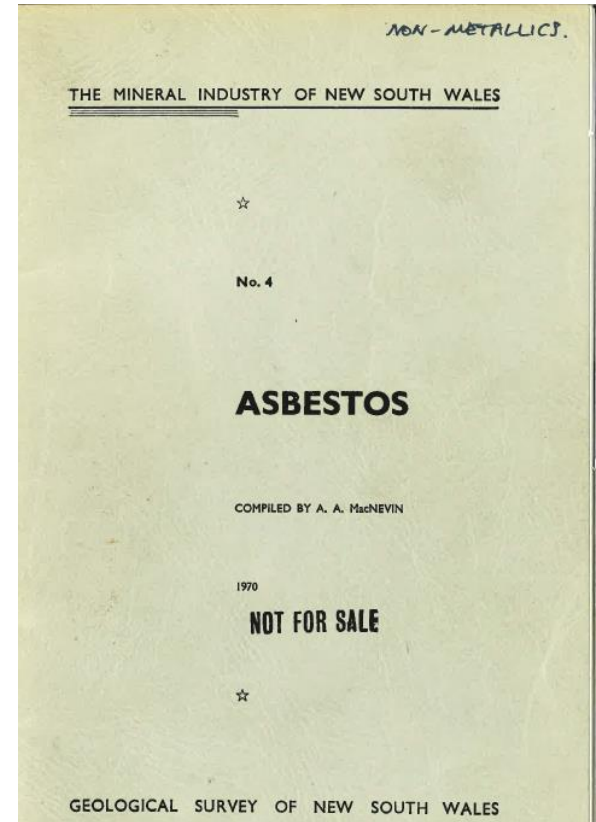
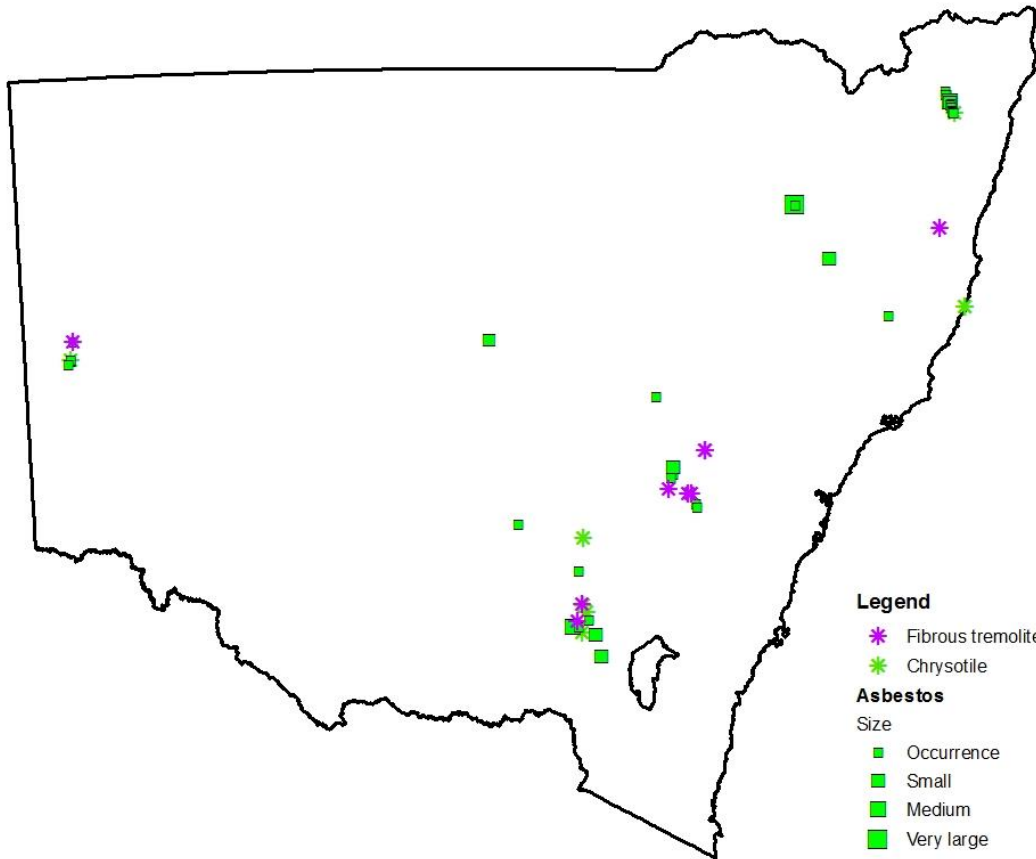


How the mapping was undertaken

- Database with known sites from historical records (~30).
- Updated to include additional sites from other sources (now ~48).
- **Selected all rocks with favourable chemistry (~10 m of the surface).**
- Identified areas where these rocks have been through an appropriate metamorphic (heat) and structural (deformation) history.
- Assigned a rank (high, medium, low) based on available data.
- Based on existing datasets and geological maps held by the Department (June 2013) — i.e. this was a desktop study.

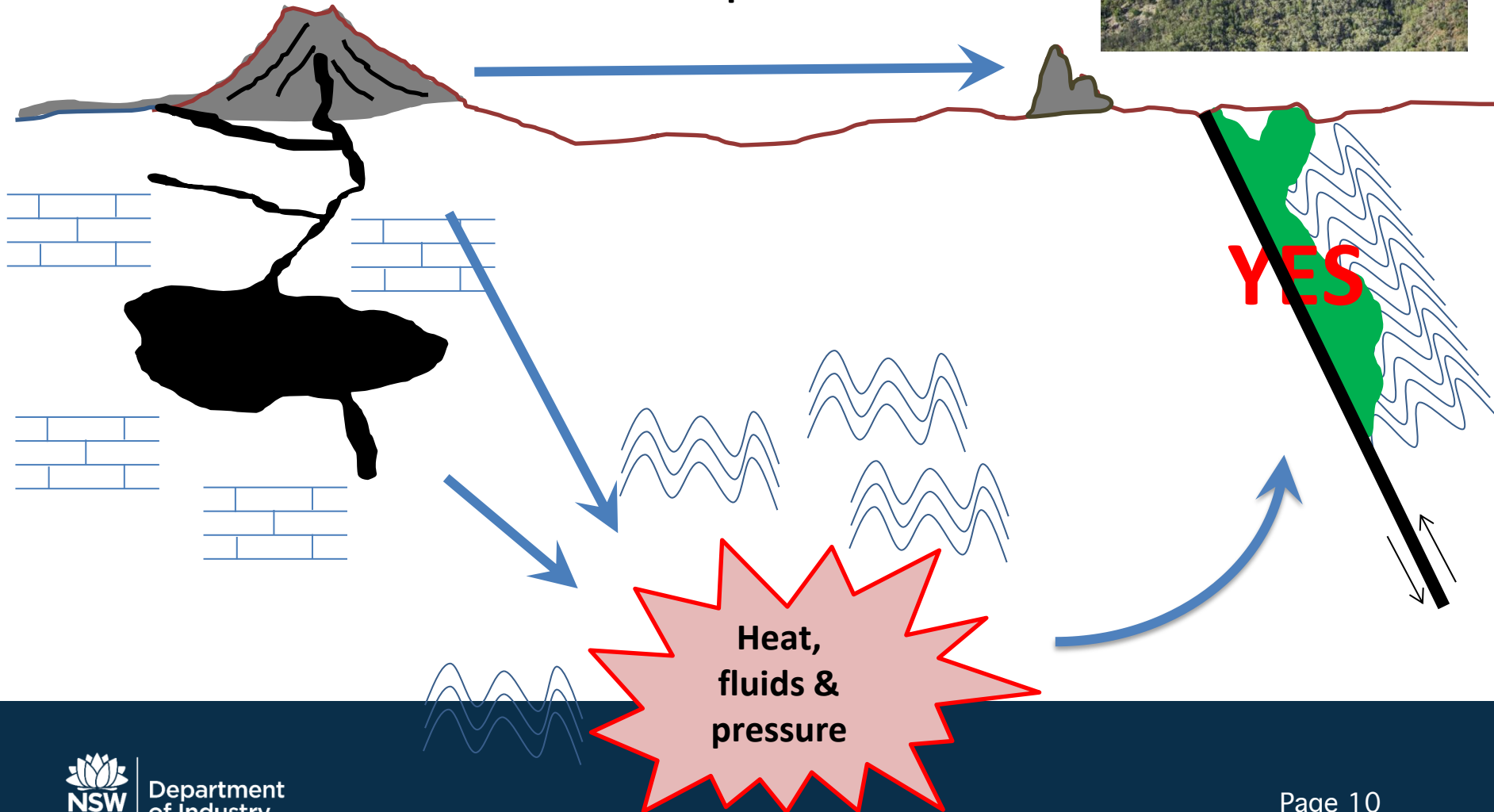
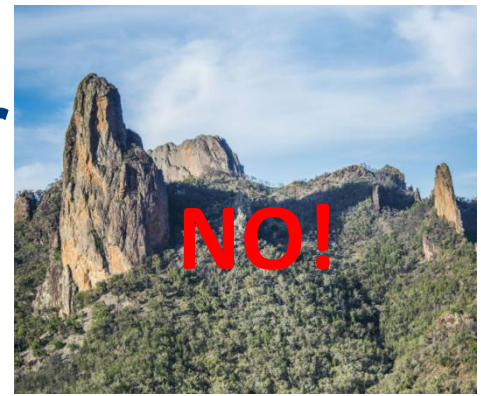
These maps represent a combination of KNOWN sites and POTENTIAL areas for NOA to occur — based on data to June 2013.

Data sources - Historical

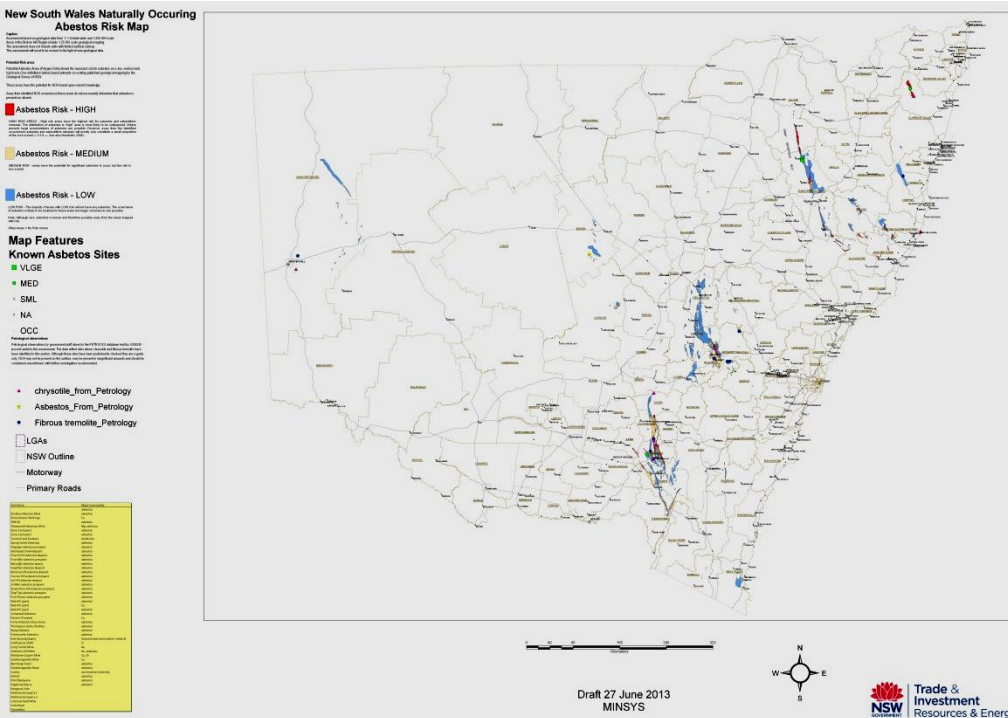


How do NOA minerals form?

Not all Fe- and Mg-rich rocks have NOA potential



State Wide Map



Tract mapping based on best available data.

- 0.83% of NSW has been identified to have the **potential** for NOA.

- High ~0.11%
- Medium ~0.16%
- Low ~0.56%

Map shows the location of:

- Known NOA sites
- Areas with potential for NOA (high, medium, low)
- Where NOA has been identified in microscopic studies (thin section)

Caveats



anthophyllite

- No systematic prediction of mineral species such as tremolite, chrysotile.
- No new petrology
- No systematic field checking
- No detailed work around known NOA sites (e.g. Woodsreef, Baryugil)
- No evaluation of underground mines, or deep open cast mines.
- Study focused on upper 10m of the earth

How the map was created: example from the Gundagai region



■ **NAME(S):** Asbestos Hill Mine

■ **Size** SMALL

Locality: Approximate location,

MINING HISTORY

Workings: underground mine

LOCATION: : 599263 mE, 6121983 mN

Location method: 25K Topo Map

Rock Type: *Hostrock(s):* serpentinite - Gundagai

■ Serpentinite

DEPOSIT CHARACTER

Ore: asbestos, tremolite, (gold)

Gangue: calcite, siderite

Resources: unknown

Production: 0t produced for 72.4t asbestos

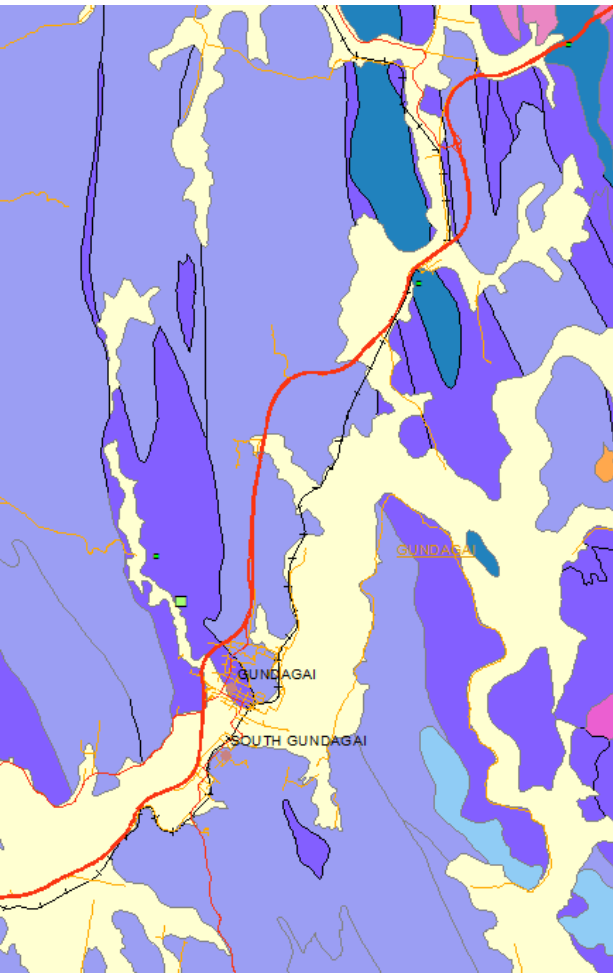
Operating Status – Not operating

SUMMARY: Asbestos vein strikes NE. Gold occurs as very fine grains coating hornblende and calcite crystals. Talc and calcite veins in footwall of asbestos vein become gold-bearing when they intersect a fissure or lode.

REMARKS: The asbestos is the tremolite variety (references in Degeling, 1982). Murray and Bowditch also prospected calcite veins in serpentinite 0.8km to the SE, on portions 14, 17 (Parish North Gundagai, County Clarendon).

REFERENCES: Geological Survey of New South Wales(1977), Basden H.(1990), GS1961/077, Winward K.(1972), Degeling P.R.(1982), Department of Mines New South Wales(1886), GS1955/050, GS1967/044, Parish Card

How the map was created: example from the Gundagai region



■ Identif

■ Geolo

➤ un

➤ ag

➤ roc

➤ tec

Identify from: Potential for any Asbestos - HIGH

- Potential for any Asbestos - HIGH
 - Eurongilly Serpentinite

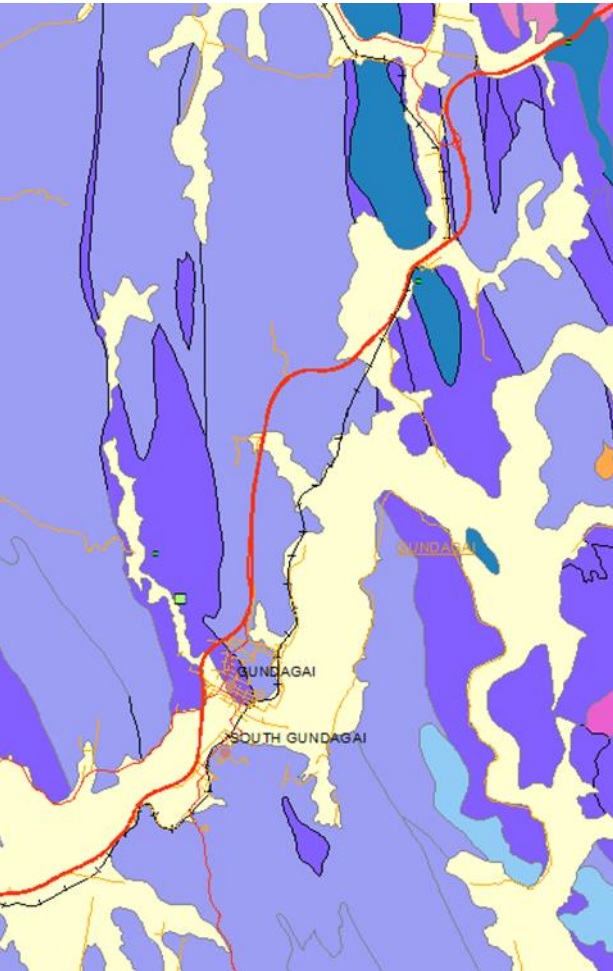
Location: 9,406,383.079 4,304,643.167 Meters

Field	Value
OBJECTID	358
SHAPE	Polygon
LetterSymbol	Ojje
Tectonic Element 0	Igneous Ocean Crust Terrane
TectonicElement1	Igneous Ocean Crust Terrane - Serpentinite
StratigraphicName	Eurongilly Serpentinite
ALL Strat	//Jindalee Group//Eurongilly Serpentinite/
Group_Suite	Jindalee Group
Formation_Pluton	Eurongilly Serpentinite
Member	
Surface	Pre-Permian basement
Scale	100000
MaximumAge	Late Cambrian
MinimumAge	Late Silurian
Rock Type	Serpentinite
DominantLithology	ULTRAMAFIC
SingleDominantLithology	serpentinite
Description	Serpentinite
AsbestosNotes	<null>
Risk	3
Source	Eastern Lachlan Orogen - v2 2006
SourceReference	GLEN R.A., DAWSON M.W., & COLQUHOUN G.P., 2006. Eastern Lachlan Orogen Geosci
SHAPE_Length	0.176063
SHAPE_Area	0.000758
Editor	JF
AreaHa	766.690092

Legend

- Stes with known Asbestos
- Regional Cities
- Highway
- Major

How the map was created: example from the Gundagai region



- All the known NOA sites in the area are associated with the Long Tunnel, Snowball and Valley View Metabasic Igneous Complex and the Jindalee Group, meta-igneous mafic and ultramafic volcanic and intrusive suites.



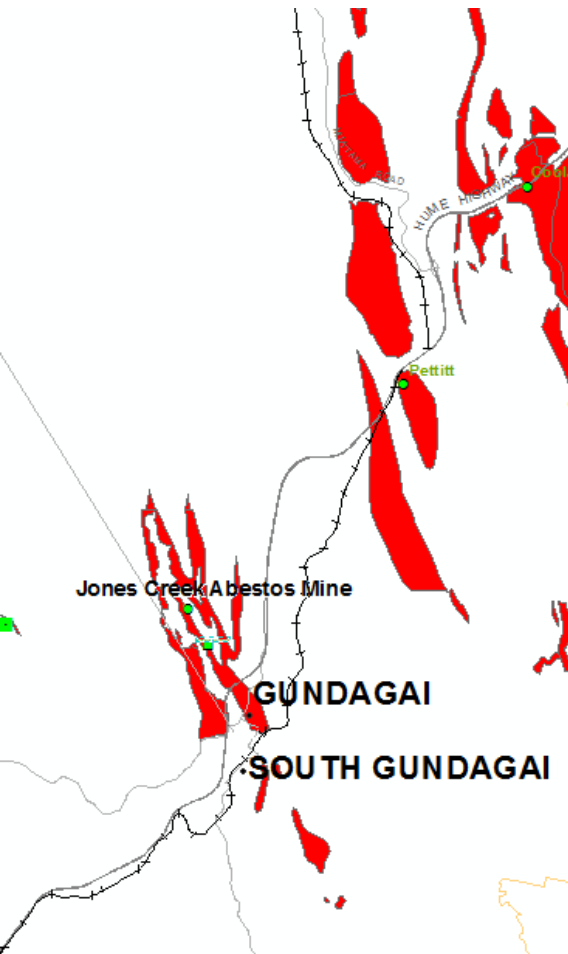
Legend

- Stes with known Asbestos
- Regional Cities
- Highway
- Major

How the map was created: example from the Gundagai region

HIGH POTENTIAL areas

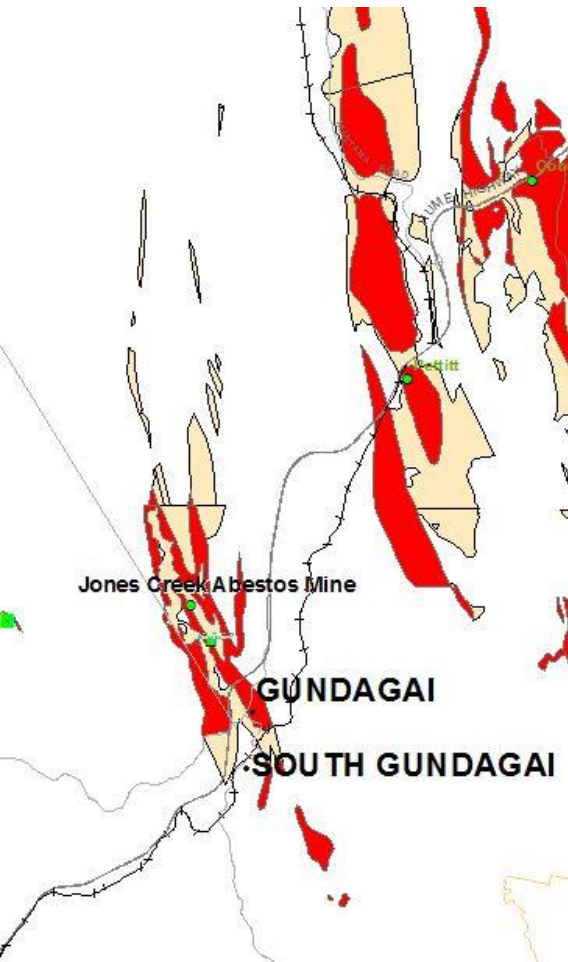
- These areas have a likelihood for NOA (asbestos & asbestiform minerals) to be widespread.
- Where present, large areas of NOA are possible.
- However, away from the identified NOA sites asbestiform minerals will mostly only constitute a very small proportion of the rock (<0.1 %).



Legend

- Sites with known Asbestos
- High potential area for Asbestos

How the map was created: example from the Gundagai region



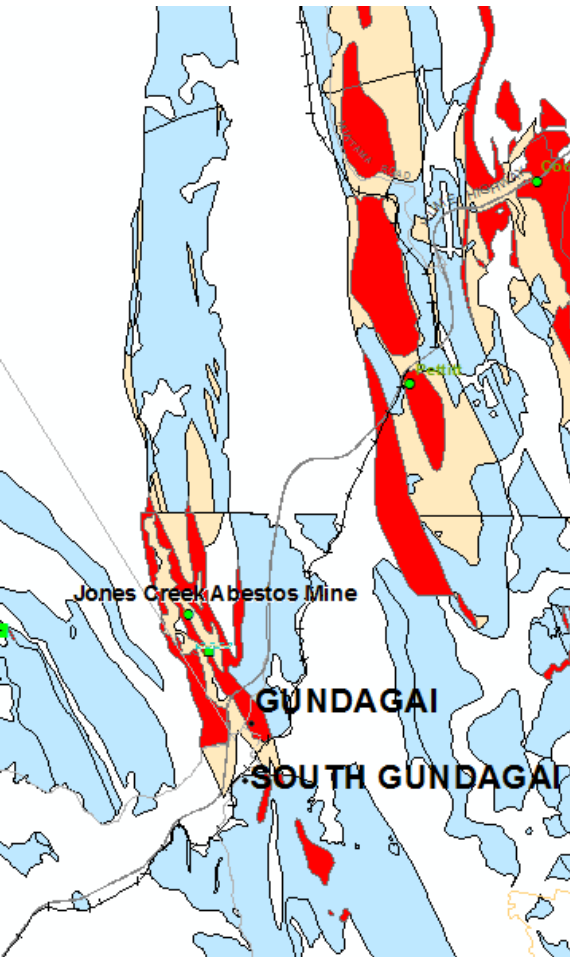
MEDIUM POTENTIAL areas

- Areas have the potential for significant NOA to occur, but the likelihood is low overall.
- The possible extent of any sites with NOA is likely to be small but larger areas of NOA are possible

Legend

- Sites with known Asbestos
- High potential area for Asbestos
- Medium potential for Asbestos

How the map was created: example from the Gundagai region



LOW POTENTIAL areas

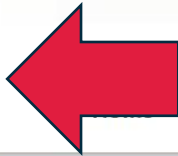
- The majority of these areas with low potential will not have any NOA.
- Any sites where NOA is present in the low potential areas are likely to be localised but larger occurrences are possible.
- Some areas have been included due to poor data and/or where mixed rock types (e.g. sediment-dominated sequences with very minor permissive rock types).

Legend

- Sites with known Asbestos
- High potential area for Asbestos
- Medium potential for Asbestos
- Low potential area for Asbestos

Data Provision

Healthy Environment, Healthy Community, Healthy Business



Protecting your environment

For business and industry

About the NSW EPA

Media and information

Contact us



Contaminated land

+ Management of contaminated land

+ Consultants and site auditor scheme

+ Underground petroleum storage systems

Guidelines under the CLM Act

NEPM amendment

- Further guidance

Decision tree for prioritising PFAS contamination

Managing asbestos in soils

Managing naturally occurring asbestos

Procedures for land managers

+ Record of notices

List of NSW contaminated sites notified to EPA

Frequently asked questions

Forms

+ Other contamination issues

+ Contaminated Land Management Program

[Home](#) > [Contaminated land](#) > [Further guidance](#) > [Managing naturally occurring asbestos](#)

Managing naturally occurring asbestos

Asbestos occurs in some rocks and soils as a natural mineral. Less than one per cent of the land surface of NSW is estimated to have the potential for [naturally occurring asbestos](#) within 10 metres of the land surface. With few exceptions, (like road building and maintenance in naturally occurring asbestos areas), the risk of exposure associated with naturally occurring asbestos is very low.

Guidance has been developed by the [NSW Heads of Asbestos Coordinating Authorities \(HACA\)](#) to provide general information on reducing potential exposure to residents, farmers and people managing recreational activities in areas identified with a high probability of naturally occurring asbestos.

This guidance has been developed in the form of three fact sheets:

1. [Factsheet 1 - Recreation in areas of naturally occurring asbestos](#)
2. [Factsheet 2 - Residing in areas of naturally occurring asbestos](#)
3. [Factsheet 3 - Farming in areas of naturally occurring asbestos](#)

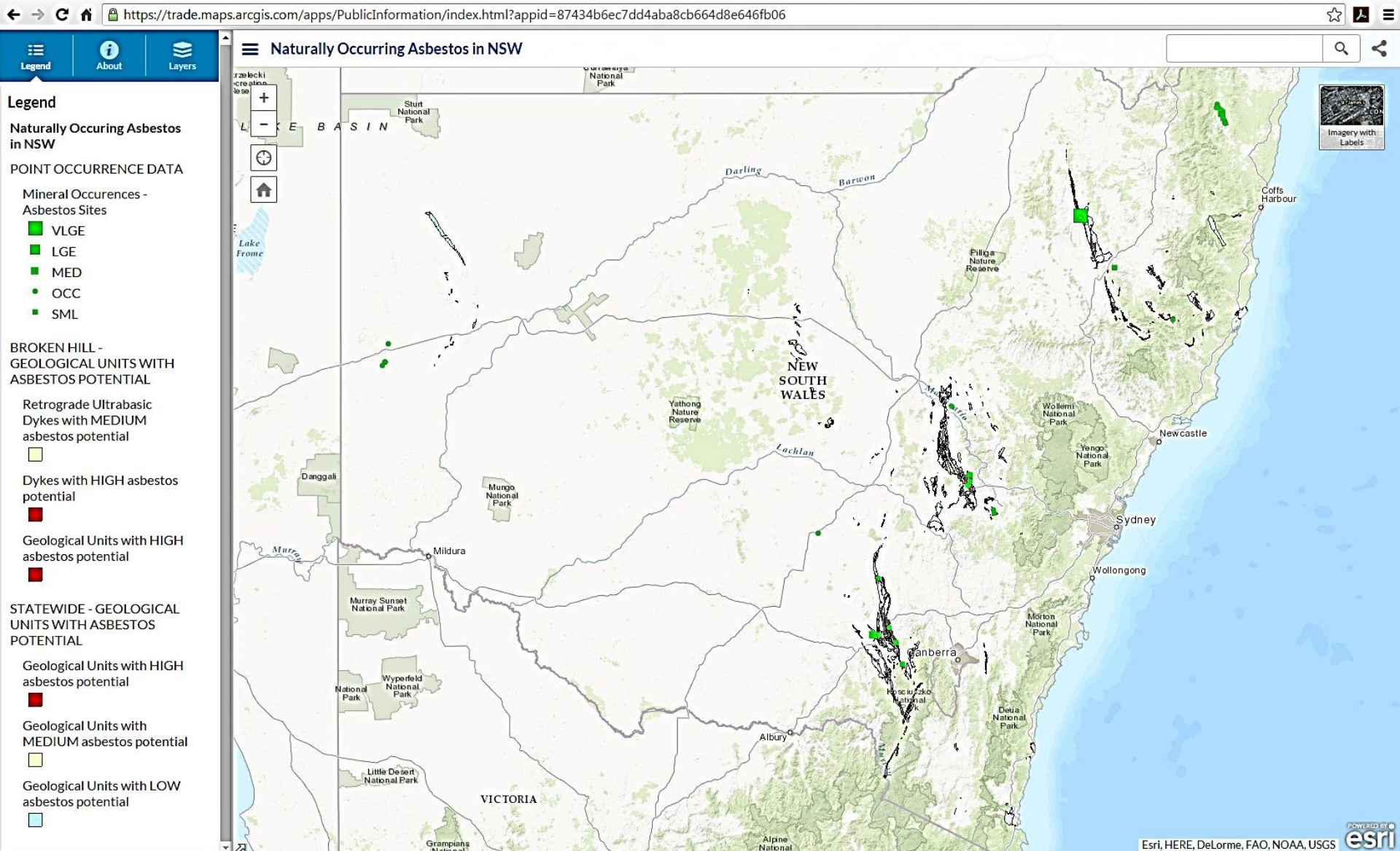
Geographic information system maps have been developed by NSW Trade and Investment, locating high, medium and low probability areas of naturally occurring asbestos. View the [Naturally-occurring asbestos in NSW](#) maps.

If you have any further questions relating to naturally occurring asbestos, please download the [NSW Government frequently asked questions sheet on naturally occurring asbestos](#).

Page last updated: 12 October 2016



Data Provision



Data Provision

www.safework.nsw.gov.au/health-and-safety/safety-topics-a-z/asbestos/naturally-occurring-asbestos

NSW GOVERNMENT SafeWork NSW

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Search

Home Health & safety Licences & registrations Law & policy Roadmap

Home > Health & safety > Safety topics: A-Z > Asbestos

NATURALLY OCCURRING ASBESTOS

It's important everyone knows what to do if they come into contact with naturally occurring asbestos (NOA).

This page provides information on NOA, and supporting documents on what you can do to avoid contact with NOA.

Asbestos is naturally occurring and can typically be found in rock (including serpentinite), sediment, or soil.

Naturally occurring asbestos can be:

- white (chrysotile)
- brown (actinolite, amosite)
- blue (anthophyllite, crocidolite)
- tremolite

Depending on the probability of naturally occurring asbestos being present, NSW has been mapped into **low, medium, or high potential regions**. Please refer to the [mapping report](#) when reviewing the mapping.

Less than 1 per cent of NSW is considered high potential.

The NSW Government's **Heads of Asbestos Coordination Authorities** has released information on these areas. This information is indicative only. If in doubt you may like to do onsite testing whether naturally occurring asbestos is present.

Naturally occurring asbestos additional resources

Asbestos

- Asbestos in your home
- Asbestos at work
- Asbestos in imported goods
- Find a licensed asbestos removalist
- Naturally occurring asbestos

[View More](#)

Contact Us

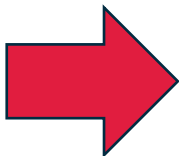
Email

contact@safework.nsw.gov.au

Telephone

13 10 50

Share this page



NOA in NSW

The Geological Survey of NSW is the custodian of mineral and commodity information. Please contact us and advise us as to the location and any other details of any NOA identified.

Geological Survey does not have accredited lab facilities for the handling or identification of NOA. Please do NOT send us samples. They will be returned. Seek advice from industrial hygienists or qualified consultants.

Refer to the relevant websites – Safework and EPA

Dealing with NOA – most Shires will have policies for handling.

HACA

The Heads of Asbestos Coordination Authorities (HACA) works to improve the management, monitoring and response to asbestos issues in NSW by developing coordinated prevention programs.

These programs include:

- a state wide plan for asbestos
- an asbestos blueprint on the role and responsibilities of state and local government staff
- a model asbestos policy for local councils
- information on property hazards after a bushfire
- a public awareness campaign to promote the safe handling of asbestos during home renovations and maintenance and help prevent asbestos related diseases.

GSNSW Online Information Systems

<http://www.resourcesandenergy.nsw.gov.au/miners-and-explorers>

The screenshot displays the website's interface. At the top left is the NSW Government logo and the text 'Department of Industry Resources & Energy'. A search bar is located at the top right. Below this is a navigation bar with categories: 'Miners & explorers', 'Investors', 'Energy consumers', 'Energy supply industry', and 'Landholders & community'. A secondary menu includes 'IMER', 'Geoscience information', 'Applications & approvals', 'Safety & health', 'Compliance & reporting', 'Programs & initiatives', and 'Rules & forms'. The main content area is titled 'Exploration and mining in New South Wales' and features a video player showing a gas burner with the caption 'Read our progress on the NSW Gas Plan'. To the right of the video is a 'Quick Links' section with several links: 'Read about the Resources Regulator first Enforceable Undertaking', 'Explore the NSW renewable energy resources map', 'Strategic release framework for exploration', 'Explore Common Ground for titles and resources in NSW', 'Application forms - minerals & coal', and 'Geological maps'. Below the video and quick links is a section for 'Online services' with six tiles: 'DIGS' (Search for exploration and geoscience reports), 'EROL' (Online lodgement of reports for exploration title holders), 'GDW' (Discover geoscientific data using Google Earth and simple web queries), 'COMMON GROUND' (Find current exploration and mining activity in your area), 'MinView' (Display and query exploration tenement and geoscience information), and 'GPC' (Download geological and metallogenic maps, their vector data and other products).

New DIGS system: 2 collections

DIGS collections combined total - over 140 000 reports
approximately 3.5 million pages, or 2 terabytes of digital data

- Reports - Company exploration reports, Dept technical research reports
- Publications – maps, books, GIS data

<https://search.geoscience.nsw.gov.au/>

The screenshot displays the DIGS search interface. At the top, there are navigation tabs for 'DIGS', 'About', 'Basic Search', and 'Advanced Search'. On the right side of the header, there are links for 'Login', 'Register', 'Saved Searches', and utility icons. The main content area features the NSW Government logo and the Department of Industry Resources & Energy. The 'DiGS' logo is prominently displayed, with the text 'Geological Survey of New South Wales' below it. A search panel is open, showing 'All', 'Reports', and 'Publications' tabs. The 'Publications' tab is selected, and the search text 'bathurst map' is entered in the search box. Below the search box, there is a checkbox for 'Search for exact phrase' and two buttons: 'Sort by: Year Published' and 'Show abstract: Yes'. A map of NSW is shown with a red dot and the text 'Click here to set your area'. Below the search panel, there is a section titled 'Latest departmental publications' with a list of three items, each accompanied by a map of NSW and a brief description.

DIGS
About Basic Search Advanced Search Login Register Saved Searches

NSW GOVERNMENT Department of Industry Resources & Energy

DiGS Geological Survey of New South Wales

All Reports Publications

Click here to set your area

Search all publications within the Geoscience Product Catalogue.

bathurst map SEARCH

Search for exact phrase

Sort by: Year Published Show abstract: Yes

Advanced Search

Latest departmental publications

Cobar Special 1:500 000 Metallogenic Map
This map portrays deposits of a range of commodity types. They include metallic, industrial and sele More...

QN 147 - Outcomes Of The Nymagee Mineral System Study - An Improved Understanding Of The Timing Of Events And Prospectivity Of T...
The Nymagee mineral system study in central New South Wales provides a new framework for understandi More...

Geophysical Projects & Product Catalogue 2016
The New Frontiers initiative was launched to stimulate mineral and petroleum exploration in under-ex More...

Geoscientific Data Warehouse

Search, Query and Download geoscientific data



Nightly Replication
Ongoing Data validation
Download as shp,tab, csv

Data sets include

- Drill holes and wells
- Field Observations (includes photos)
- Mineral Occurrences
- Metal commodities
- Whole Rock geochemistry
- Petrology

View only

- Soils and landforms (CSIRO)
- Exploration & Mining Titles
- Topographic & cadastral data (LPI)
- Imagery (LPI)
- Georeferenced geology maps

Drillholes and wells

Description

The drillholes & wells dataset contains collar information for mine (including coal seam gas) that are recorded in the Mineral Resources including historic databases, core library inventory, industry programs.

Only open data is available on this system. Confidential drillholes:


- Mineral drillholes: All data withheld
- Coal drillholes: All data withheld
- Petroleum wells: Locations & limited information is available

Data descriptions

Coal
Minerals
Petroleum


Retrieve drillholes

Drillhole category: Minerals ▼
PROGRAM contains:
HOLE_NAME contains:
LICENCEE contains:
OPERATOR contains:
TITLE_TYPE contains:
TITLE_NO contains:
SITE_ID contains:
CORE_LIBRARY contains: Broken Hill ▼

 The white rectangle shows your area of interest. It covers most of the state, so ALL data will be seen even un-located data and data outside of the rectangle. Click on the graphic if you wish to define a smaller area.

Field Observations

CAPT - JAF0509

 Subuded outcrop of the Tallaganda Granodiorite. JA Fitzherbert (2011-10-24)

- **Observed:** Oct 24 2011
- **Coords:** -35.582357,149.480069 ([GMaps](#) / [GEarth](#))
- **Accurlon:** GPS located
- **Stratigraphy:** Tallaganda Granodiorite
- **Locality:** Harolds Cross Road
- **Context:** Coarse grained qtz/field/plag, granodiorite. Loads of mafic clots that look as if they may be hornblende. Medium to coarse grained. Mag sus 0.0722, 0.0882, 0.0826, 0.0764. Sample taken.
- **Outcrop:** in-situ outcrop
- **Weathering:** slightly weathered

Granodiorite

- **Lithqualif:** Massive
- **Msinstr:** SM30
- **Ms_unit:** 10exp-3 SI
- **Mssamples:** 4
- **Msmeanis5:** 7.9975
- **Msminis5:** 7.27
- **Msmaxis5:** 8.82

Igneous Element

- **Rockdescr2:** Crystals
- **Rockdescr3:** - NA -
- **Grainsize:** Coarse grained

Geoscientific Data Warehouse

Search, Query and Download geoscientific data



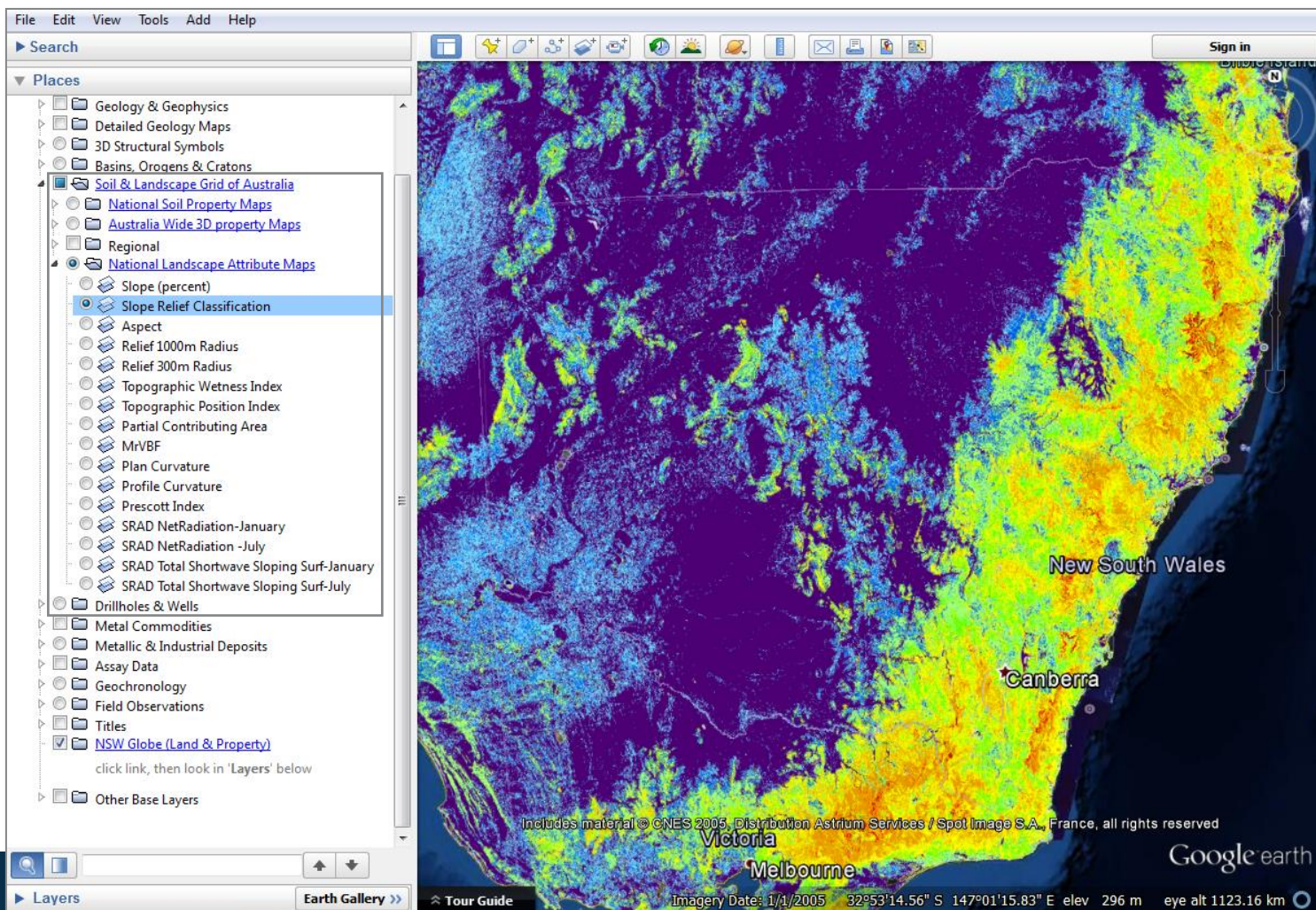
<http://dwh.minerals.nsw.gov.au/CI/warehouse>

Metal Commodities

The screenshot displays the Geoscientific Data Warehouse interface. On the left, a search sidebar is visible with a tree view under 'Places'. The 'Metal Commodities' category is expanded, and a list of metals is shown, including Aluminium, Antimony, Arsenic, Beryllium, Bismuth, Chromium, Cobalt, Copper, Gold, Iron, Lithium, Lead, Mercury, Magnesium, Manganese, Molybdenum, Nickel, Niobium, Palladium, Platinum, Scandium, Silver, Tellurium, Thorium, Tin, and Titanium. The 'Copper' and 'Gold' items are checked. The main map area shows a satellite view of New South Wales, Australia, with numerous yellow and green dots representing metal commodity data points. Labels for 'New South Wales', 'Canberra', 'Melbourne', and 'Victoria' are visible on the map. The bottom of the interface shows the Google Earth logo, a 'Tour Guide' button, and technical data: 'Imagery Date: 1/1/2005 32°53'14.56" S 147°01'15.83" E elev 296 m eye alt 1123.16 km'. The NSW Government logo is in the bottom left corner.

Geoscientific Data Warehouse

Soil & Landscape Grid of Australia – CSIRO (Web Map Services)



Thank you!